Using your knowledge of graphing polynomial equations, even and odd functions, factoring and roots, graph the following functions. Show all calculations and work in the space provided.

1. \( y = x^4 + x^3 - 8x^2 - 2x + 12 \)

\[
\begin{array}{c|cccc}
1 & 1 & 1 & -8 & -2 & 12 \\
\hline
-1 & -6 & 9 & 4 & -12 \\
\hline
-1 & 1 & 6 & 12 & 0 \\
\end{array}
\]

\( x^2 + 3x^2 - 2x - 6 \)

\( x^2 + 3x - 2(x + 3) \)

\( x + 1 \) is a factor

\( x = 2, -3, \frac{12}{2}, -\frac{12}{2} \)

\( x = 2, -3, 1.41, -1.41 \)

\( y \)-intercept

\( y = (-2)(-2)(3) = 12 \)

2. \( y = x^4 - 6x^3 + 9x^2 + 4x - 12 \)

\[
\begin{array}{c|cccc}
1 & 1 & -6 & 9 & 4 & -12 \\
\hline
-1 & -6 & 9 & 4 & -12 \\
\hline
-1 & 1 & -6 & 12 & 0 \\
\end{array}
\]

\( x^3 - 7x^2 + 16x - 12 \)

\( (x + 1) \) is a factor

\( x = 1, 2, 3 \)

\( y \)-intercept

\( y = (1)(-2)(-3)(-2) = -12 \)

\( x = 1, 2, 3 \)

\( y = (x + 1)(x - 2)(x - 3)(x - 2) \)

\( x \)-intercepts

\( x = -1, 2, 3 \)

\( y \)-intercept

\( y = (1)(-2)(-3)(-2) = -12 \)